MSN 1020, ANSWERS TO PILOTS SQUAWK LIST

1 BACKGROUND

On the 29th September 2008, PC-12/47E, MSN 1020 crashed during the approach to Santa Fe, NM, USA.

The pilot had created a squawk list, [1], during the previous months of operation. NTSB requested Pilatus to comment these squawks, [2].

2 PILATUS COMMENTS

2.1 3RD AUGUST 08

8/3/08 -Amber CAS "check du-4" Display 4 was dark. No breakers out. I switched copilot PFD from norm to AGM1 and DU #3 went blank. Switched back to Norm and DU 3 came up instantly but DU4 still dark. Completed flight. When powered back up for next flight, red X on DU 4 but it came up momentarily. It then showed small Xs indicating invalid readings, and I got ADAHRS failed CAS. Then the X went away the ADAHRS warning went away and all was normal. No CAS warnings on flight afterwards.

Pilatus comment:

Looks like a one-time power up problem. This has been observed by Pilatus if the power-up sequence detailed in the AFM is not followed correctly. DU3 blanking is normal if AGM2 is in reversion mode. The reported red Xs and ADAHRS cautions are normal behaviour during startup.

Since it is start-up issue only, no link to accident can be drawn.

Pilatus is of the opinion that the AFM/POH contains adequate procedures to avoid this issue.

2.2 3RD AUGUST 08

8/3/08 – WX Fail red box on PFD #1. Cycled radar off, stby, and wx and radar came up on PFD#1 and worked properly, WX fail warning went away. No breakers out

Pilatus comment:

This happens occasionally and is most likely caused by a video bus issue.

Weather or availability of the weather radar did not play any role in the accident.

Wiring improvements are currently investigated.

TO	NTSB					
CC	Honeywell Phoenix, PilBAL, EC, E					
Department	ER	ECA	EC	ER	E	
Approvals	Author	Checked	Approved	Approved	Approved	
Name/Sign.	[redacted]					
Date	27-Feb-09	27 FEB 09	27.Feb.09	27.02.09	27.2.09	

2.3 8TH AUGUST 08

8/8/08 Transponder mode S out. Went into detail and changed it to traffic. Do not know how it reset itself. Had another problem next day and switched to number 2 transponder and everything seemed to work. Will keep an eye on it

Pilatus comment:

Suspect faulty XPDR 1 unit.

Transponder worked fine until the crash and did anyway not play a role in the accident event.

Customer should have requested changing the unit so it could have been investigated at Honeywell.

2.4 9TH AUGUST 08

8/9/08 Three or four times an amber warning flashed on the screen and the light blinked but it was too fast to read what it was. This has been continuing on each flight and includes audible.

Pilatus comment:

This is either a momentary Check DU- or Check Engine Display Caution, caused by a minor software snag. At no time does the display actually go blank or show invalid data.

No link to accident can be seen by Pilatus.

This is a minor software snag and is corrected in build 5.

Cannot intercept airways nor display them on inav.

Pilatus comment:

This is most likely a training issue.

Since the aircraft was on a visual approach to the airport, no link to the accident can be seen by Pilatus.

Set has 300kts automatically loaded and this must be indicated because ground speed shows 455 kts on the flight plan. However the estimated times seem to reflect reality.

Pilatus comment:

This one is difficult to answer. The FMS uses either current groundspeed/fuel flow or pilot defined values. Could be linked to missing aircraft database (see below).

Since the aircraft was on a visual approach to the airport, no link to the accident can be seen by Pilatus.

Software build 5 contains improvements to address the issue.

Dark browninsh straing line about ¼ inch wide occasionally shows up on inav screen.

Pilatus comment:

Rendering issue caused by the AGM.

This issue does not affect the PFD's and since the aircraft was on a visual approach to the airport, no link to the accident can be seen by Pilatus.

This issue is fixed in software build 5

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Transponder seems to sometimes change from one to two, and to standby (not TA) without any input or change in procedure. Have had inexplicable "no mode C" from ATC, and I have had to go to detail and switch it back to normal.

Pilatus comment:

It's very unlikely that the transponders switch without pilot interaction. The antennas are shared between the two transponders and switched by a relay. Without a clear GND supplied from the MAU the relay would not switch to XPDR2.

Transponder worked fine until the crash and therefore had no impact on the accident event.

No corrective actions can be proposed since problem analysis is no longer possible and it appears to be an aircraft issue.

Is there a way to have the transponder on on the ground as required at HOU and some other airports with ground radar.

Pilatus comment:

When on the ground and not in standby mode the XPDR will automatically inhibit ATCRBS, ATCRBS/Mode S All Call and Mode S-only All Call replies. However, the unit will continue to generate Mode S squitter transmissions and reply to discretely addressed Mode S interrogations.

This is a question only which concerns ground operation.

No corrective actions required

Compass showed heading of 190 when true heading was 257 and track was 255 on 9/5. Never looked at it before, but will check on a future flight.

Pilatus comment:

The E2B (standby compass) can only be used reliably if the following conditions are met: Windshield De-Ice OFF, Electrical Heat/Cool INHIBIT, Probes De-Ice OFF, Footwarmer OFF (if inst.).

Pilatus cannot see a link to accident. From radar track it can be concluded that the pilot knew exactly where he was and which way he was heading.

No corrective actions required

2.5 1ST SEPTEMBER 08

9/1 ADHR 2 Fail CAS. ATT and HDG Xed out on copilot side. CP side ADHRS and PFD buttons pressed-inop. Switched CP PFD to AGM1 and DU3 whent blank with red X. Came back when switched back to normal. Pulled ADHRS B breaker on CP side and reset. AP went off. Came back on when reset. Everything reinitialized and came up normal balance of flight.

Pilatus comment:

The ADAHRS 2 most likely failed. Pilot should have been able to display ADAHRS 1 on Copilot side and perform a reset in the meantime. PFD button does not work, as indicated on INOP Buttons Placard.

Issue affects copilot side only. No mention of an issue with the pilot-side. Pilatus cannot see a link to accident.

No corrective actions can be proposed since aircraft can no longer be trouble shot.

2.6 5TH SEPTEMBER 08

9/5 After being engaged business as usual on initial climb out, CAS blue came on Flight Dir, Auto pilot and Yaw damper fail all came on. All lights for these items were off on right side of AP including the right/left FD indicator. Hand flew for about ten minutes. Checked all breakers. Engaged trim interrupt, pulled and rest trim breaker. Pushed every button I could think of to no avail. Decided to hand fly to destination and hope that it would come up after shutdown and restart for next flight. Then after a few more minutes before I read the POH for clues, the magenta line appeared, and all of the functions came back online. This happened a couple of minutes after my last actions, so I cannot say it was the result of any corrective action on my part.

Pilatus comment:

Autopilot was set invalid by AFCS internal Roll monitor. This is due to the fact that the ADAHRS probably showed a difference in roll that was exceeding the AFCS internal tolerance. Once the two ADAHRS channels agreed the autopilot was valid again.

Pilatus cannot see a link to accident. The last few minutes were certainly flown under VMC conditions with reference to outside cues as indicated by the pilot switching on the runway lights. An autopilot disconnect in-itself would not have led to the abrupt excursion to the left from the approach altitude that was seen, nor would it put the aircraft in a steep descent attitude.

Changes to the AFCS roll monitor value will be made in software build 5.

Is there a way to set an OBS. For example to draw a line to a runway threshold when there is no approach or other reference to use?

Pilatus comment:

Lateral reference guidance can be set using graphical flight planning. A pilot-defined waypoint can be set anywhere using the iNav map. Vertical guidance is of advisory type only.

This is a question only which has no relevance to the accident.

No corrective actions required.

Static on the SAT AUD MUTE when it is disengaged. Could be a wiring or shield issue?

Pilatus comment:

Satcom - ?

No link to accident. Question only

No corrective actions required.

On initialization, the airplane weight is no longer in there and needs to be entered each time. This just happened one day and has stayed that way since. May be at the same time the speed changed to a higher number, presumably the stats for a jet the software is used in. Also, it now defaults to pilot input instead of automatic GPS on some fields.

Pilatus comment:

The aircraft lost its aircraft database. Most likely caused by uploading or downloading of data (see comment above).

No link to accident can be seen by Pilatus.

No corrective actions required

2.7 11TH SEPTEMBER 08

9-11 ahars b, fd, ap, yd all fail after takeoff, then it switched by itself to right side (pilot side was xed out. Then ap,yd fd came back up on left side and right side stayed exex out remainder of flight. Next flight that day, all came up and operated normally for entire flight. Note, when ahars b was out with hdg and ai xed out, the airspeed and altitude and other items were accurate.

Pilatus comment:

This report makes no sense. First the right side was valid (left side X'd out) then the autopilot came back on the left side (left side must be valid now) and suddenly the right side is now X'd out for remainder of flight?

Pilatus cannot see a link to accident. The last few minutes were certainly flown under VMC conditions with reference to outside cues.

2.8 19TH SEPTEMBER 08

9-19 XPDR 1 fail, switched to #2.

Suspect faulty XPDR 1 unit.

Transponder worked fine until the crash and therefore had no impact on the accident event.

Customer should have requested changing the unit so it could have been investigated at Honeywell.

2.9 21ST SEPTEMBER 08

9-21 still having problems with tranponder, esp #1

Suspect faulty XPDR 1 unit.

Transponder worked fine until the crash and therefore had no impact on the accident event.

Customer should have requested changing the unit so it could have been investigated at Honeywell.

2.10 21ST SEPTEMBER 08

9-21, after top off, had CAS Fuel Quantity Fault. Left side exed out, right side ok. Would not reset. During flight monitored fuel flow and bar reduction coinsided with both tanks being used, but left tank exed out.

Pilatus comment:

If the FQC detects a malfunction within itself or at the probes or wiring it will issue an information (FUEL QUANTITY FAULT caution) within the ARINC label for the fuel quantity of the respective tank. The Fuel Reset Function is unavailable if an FQC fault condition is detected or one or both fuel quantity values are faulty or missing.

During flight came up once with white bars even on both sides (about ½ tank-which was wrong) but amber bars above white bars on right side up to true level, went back and forth a couple of times, allowed reset to proper total qty during this back and forth and then settled in with the X on left and prior condition. Checked tanks visually, even on both sides fuel slightly visible in wings.

Pilatus comment:

For some faults when FQC defect disappears after it was detected, the fuel indication returns automatically to normal. In some cases FCMU reset is required. If a large unbalance is detected (more than 3 bars), the imbalance is shown in amber.

The fuel reset is possible if the fuel quantities are valid.

The above squawk deals with a fuel indication issue. Since it was established that the engine was developing power and a large amount of fuel was still on board feeding the post-crash fire, lack of fuel due to a faulty fuel indication was no issue.

If at all, then it seems to be an aircraft issue that can no longer be investigated.

2.11 25TH SEPTEMBER 08

9-25, fuel qty system worked normally. Qty was balanced.

Pilatus comment:

Comment only

3 PILATUS CONCLUSIONS

Pilatus concludes that none of the logged squawks may have contributed causal to the accident.

4 REVISIONS

Original issue

5 REFERENCE

[1] 
SN1020
Squawks. Rick Gardne

[2] E-mail, NTSB, Jennifer Rodi (Kaiser), 17.11.08